SIEMENS

SIMATIC NET Network Solutions for PROFIBUS according to IEC 61158/EN 50170

Product Brief **September 2001**

PROFIBUS is the bus system for communication in small cell networks and with field devices. It is based on the IEC 61158/EN 50170 European Standard, Volume 2, PROFIBUS. In this way PROFIBUS ensures an open system for connecting the components of other manufacturers that conform to the standard.

PROFIBUS – the standard in field installations – comprises:

- Defining the standards for the physical bus level and for access methods (layers 1 and 2 of the ISO Reference Model).
- Defining the user protocol and the user interface
  PROFIBUS-FMS (layer 7) for communication between programmable controllers and field devices.
- PROFIBUS-DP for fast, cyclic data exchange with field devices.

PROFIBUS meets the requirements for simple cabling in electrical and optical transmission technology. This makes it possible to cover great distances.

PROFIBUS provides connection options for a wide range of Siemens automation systems and third-party systems for implementing small cell networks.

With network components from the SIMATIC NET® product range, PROFIBUS networks can be set up simply and quickly.

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PROFIBUS topologies
Optical network

The fiber-optic cable version of PROFIBUS has the following properties:

- Resistance to electromagnetic interference
- Suitable for wide ranges
- Galvanic isolation
- Either plastic, PCF or glass fiber-optic conductors can be implemented

Optical networking with OLM

An optical network can be implemented in a bus, star or hot standby ring topology using Optical Link Modules (OLMs®).

Because the OLM can be used universally, it is the solution to practically every automation task.

The maximum distance between two OLMs can be up to 15 km.
The transmission rate can be adjusted in steps from 9.6 kbit/s to 12 Mbit/s.

Optical networking with integrated interfaces and OBT

Optical networking with integrated interfaces and OBT® is configured in a bus topology.

A cost-optimized solution in the form of devices with integrated optical interfaces is available for this.

Data terminals with RS 485 interfaces or existing RS 485 segments can be connected via an Optical Bus Terminal (OBT).
The maximum distance between two stations is 50 m with plastic fiber-optic cables.

Special fiber-optic cables (PCF = Polymer Cladded Fiber) are provided for covering distances up to 300 m.

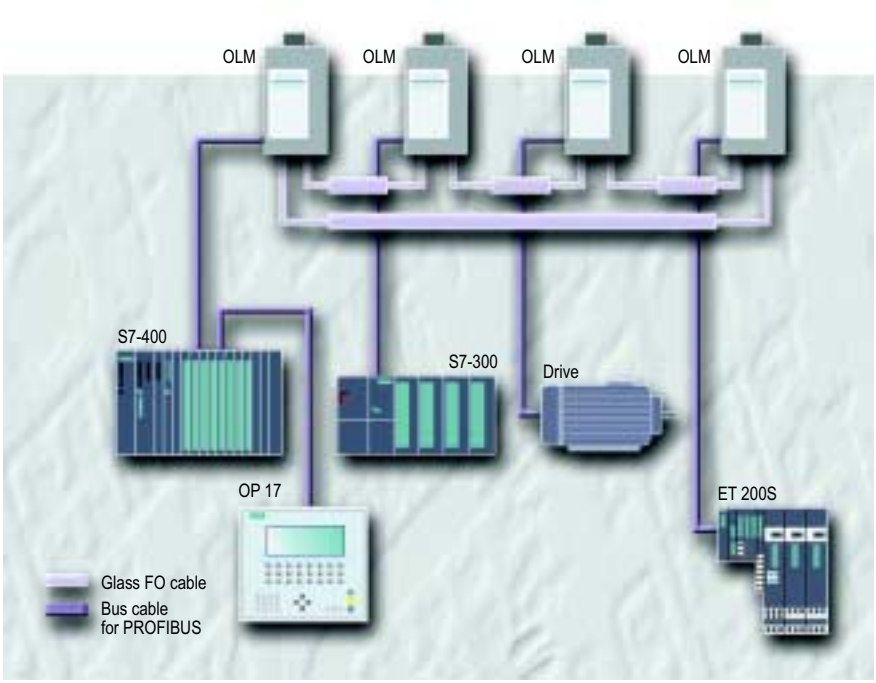

Figure 1: Typical configuration for optical PROFIBUS with OLM

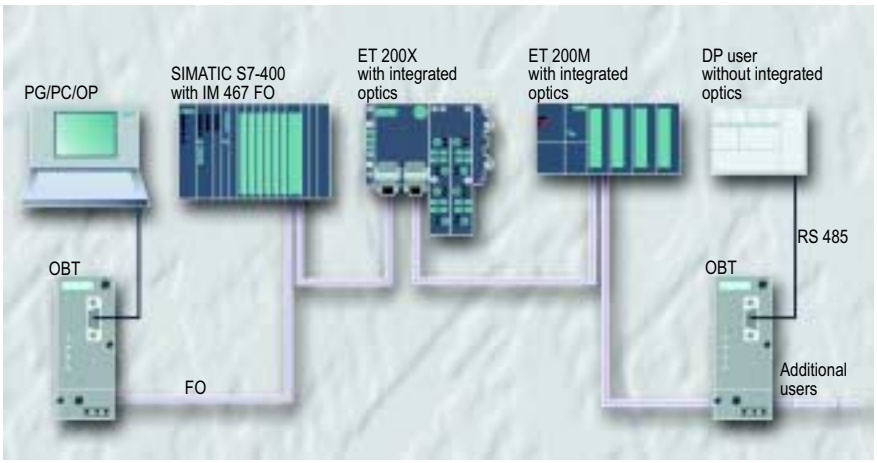

Figure 2: Network configuration optical lines

Figure 3: Cost/performance ratio

PROFIBUS topologies
Mixed network and wireless link

Mixed network

Mixed structures combining electrical and optical networks are possible.

The transition between the two media is provided by the OLM.

In the communication between the stations on the bus, there is no difference between two-wire and fiber-optic technology.

Up to 127 stations may be connected to a PROFIBUS network.

The optical transmission method offers the following advantages:

- Plastic or glass fiber-optic cables are insensitive to electromagnetic radiation and make the EMC measures necessary in electrical networks superfluous
- In outdoor installations, there is no need for lightning protection measures
- Fiber-optic cables make floating connections between the system components. This means that there is no need for expensive equipotential bonding measures.
- Fiber-optic cables can cover long distances between stations.

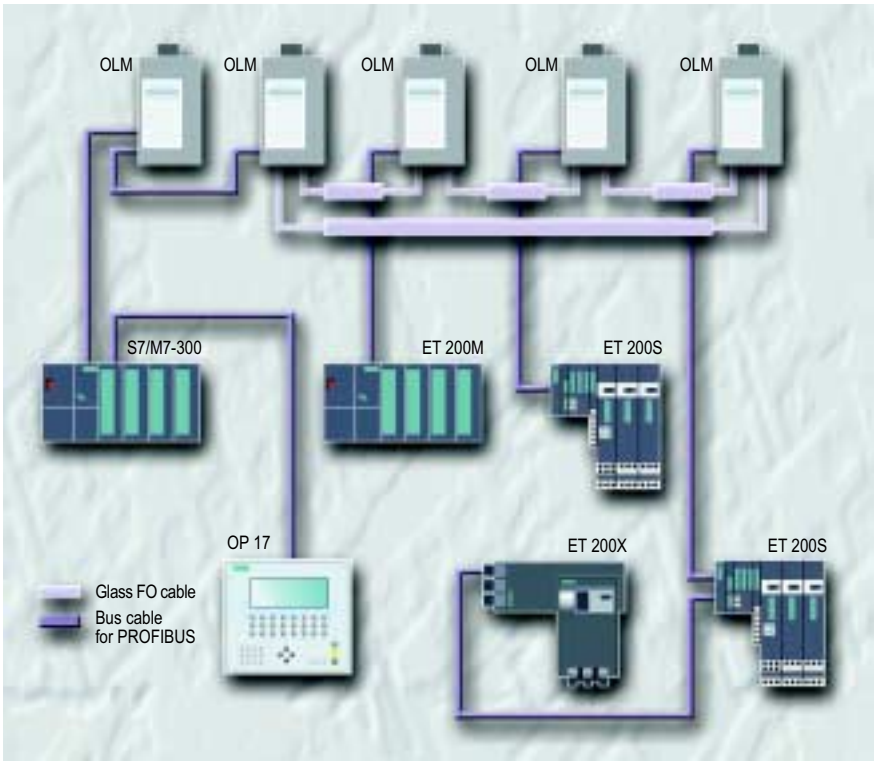

Figure 4: Typical configuration combining electrical and optical PROFIBUS

Wireless link with ILM

The PROFIBUS Infrared Link Module (ILM) can be used for the wireless connection of individual or several PROFIBUS slaves or slave segments.

At a maximum transmission rate of 1.5 Mbit/s and a maximum range of 15 m, it is possible to communicate with moving components, e.g. with driverless transport systems (DTS) or substitute for worn systems (slip rings, conductors).

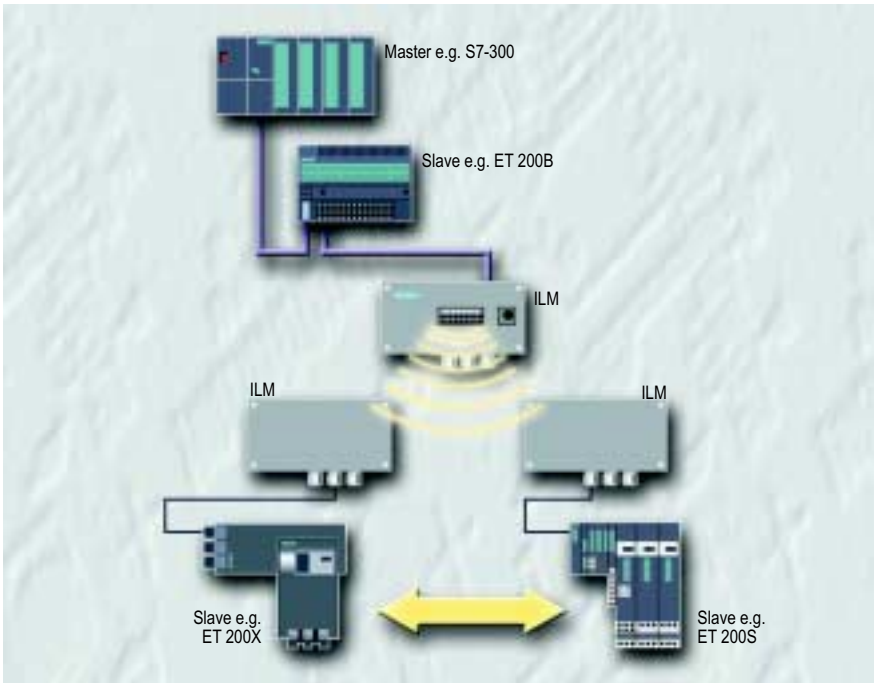

Figure 5: Linking to mobile stations

PROFIBUS topologies
Electrical network

SIMATIC NET offers a wide range of PROFIBUS network components for electrical and optical transmission technology.

Electrical network

- The electrical network uses a shielded, twisted pair cable. The RS 485 interface operates on voltage differences.
  It is therefore less sensitive to interference than a voltage or current interface.
  In PROFIBUS, the nodes are connected to the bus by a bus terminal or a bus connector (max. 32 nodes per segment).
- The individual segments are connected via repeaters.
- The transmission rate can be adjusted in steps from 9.6 kbit/s to 1.5 Mbit/s. For extremely time-critical PROFIBUS-DP applications, additional transmission rates of 3, 6 and 12 Mbit/s are possible.
- The maximum segment length depends on the transmission rate.
- The electrical network can be configured as a bus or tree topology (see Figure 6).
- For applications in the intrinsically safe area, PROFIBUS-PA uses transmission technology according to IEC 61158-2. In this case, the transmission rate is 31.25 kbit/s.
- The DP transmission method is implemented by RS 485 (bit coding by voltage difference signals) according to IEC 61158-2 (bit coding by current signals) by the network components (DP/PA coupler or DP/PA link)

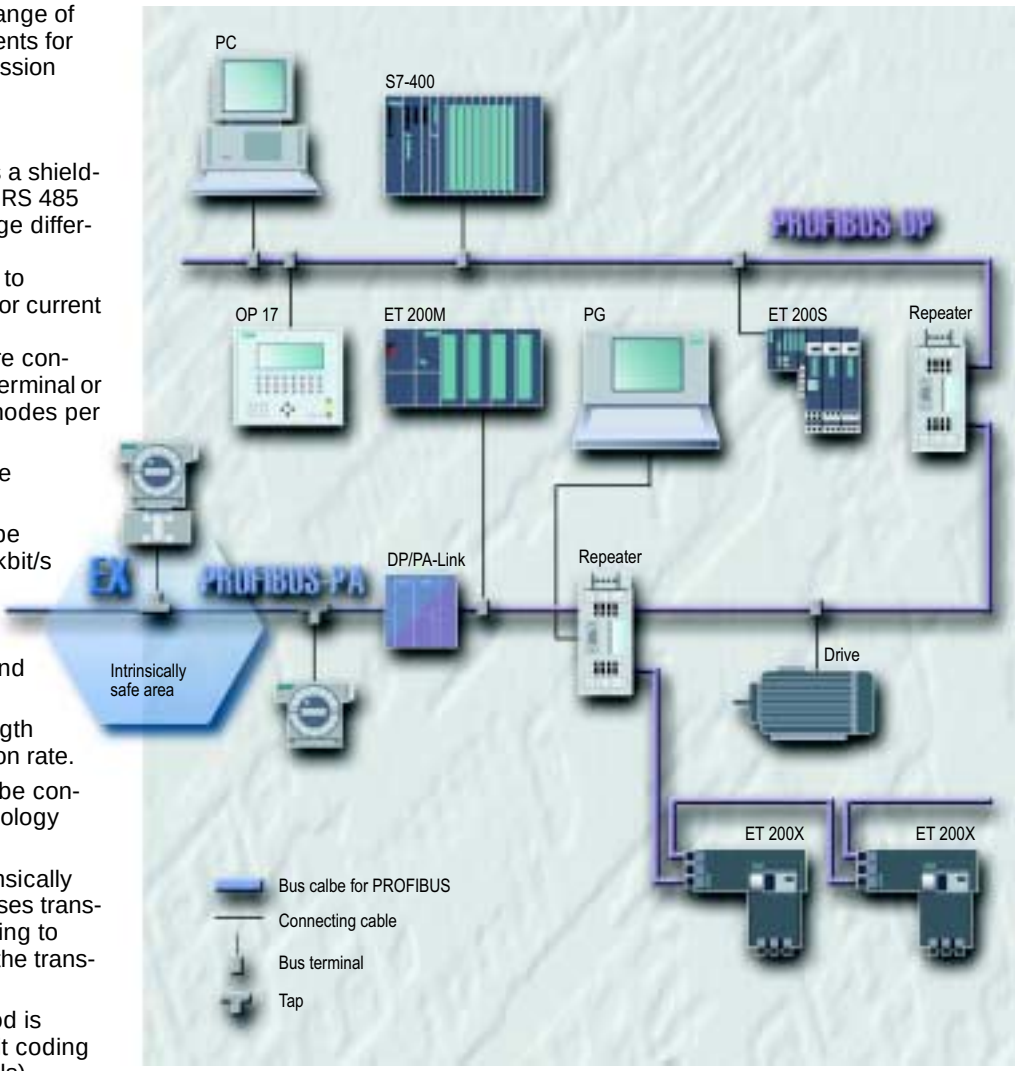

Figure 6: Typical configuration electrical PROFIBUS network

Features:

- High-quality LAN cable
- Transmission method: RS 485 (according to EIA) or transmission method IEC 61158-2 for the intrinsically safe area (PROFIBUS-PA)
- Bus topology with bus terminals and bus connectors for connecting the PROFIBUS nodes
- Simple, system-wide mounting and grounding concept
- Simple installation.

Network selection criteria for electrical and optical networking

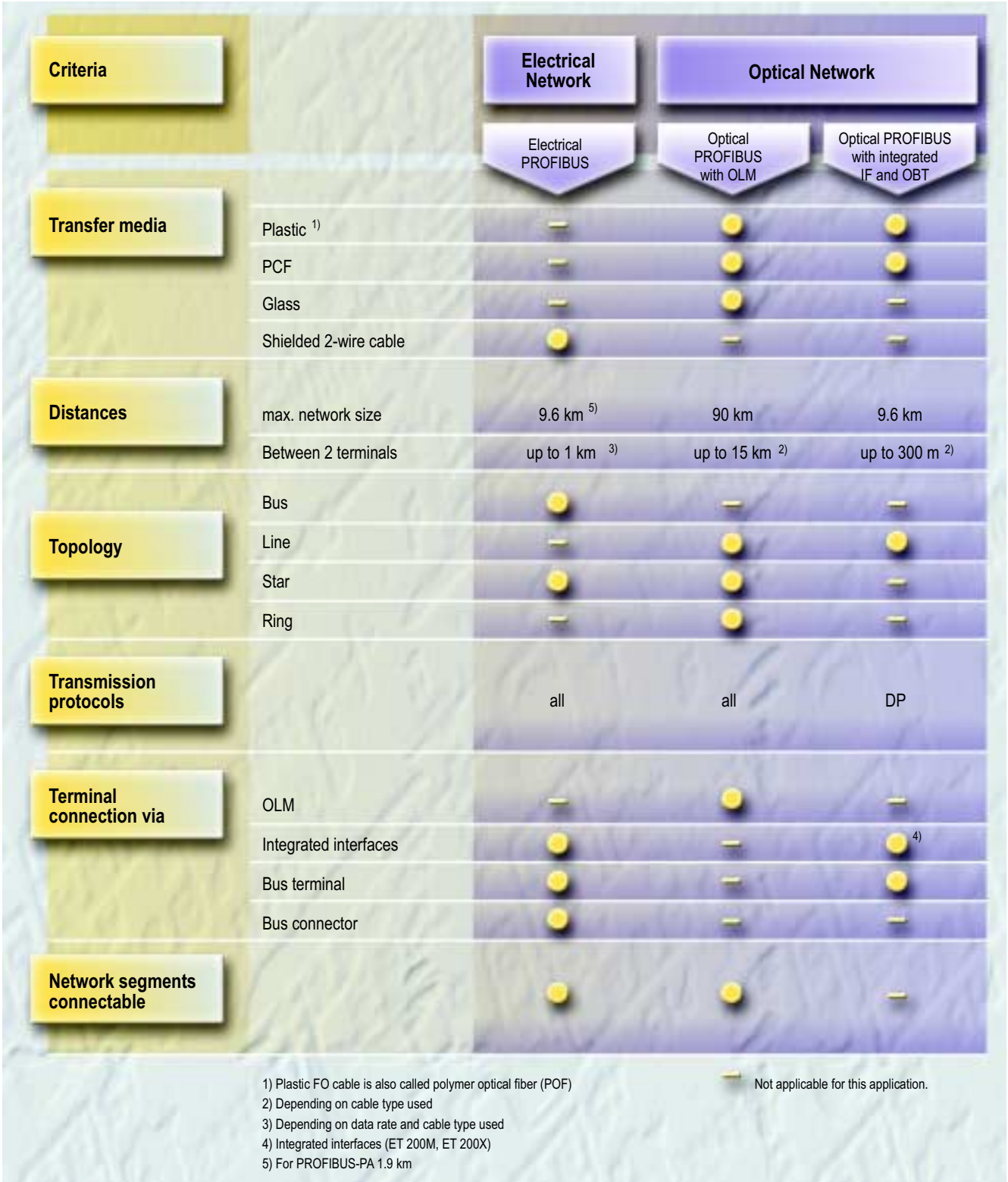

Figure 7: Selection criteria for electrical and optical networking

Network selection criteria for the transmission media

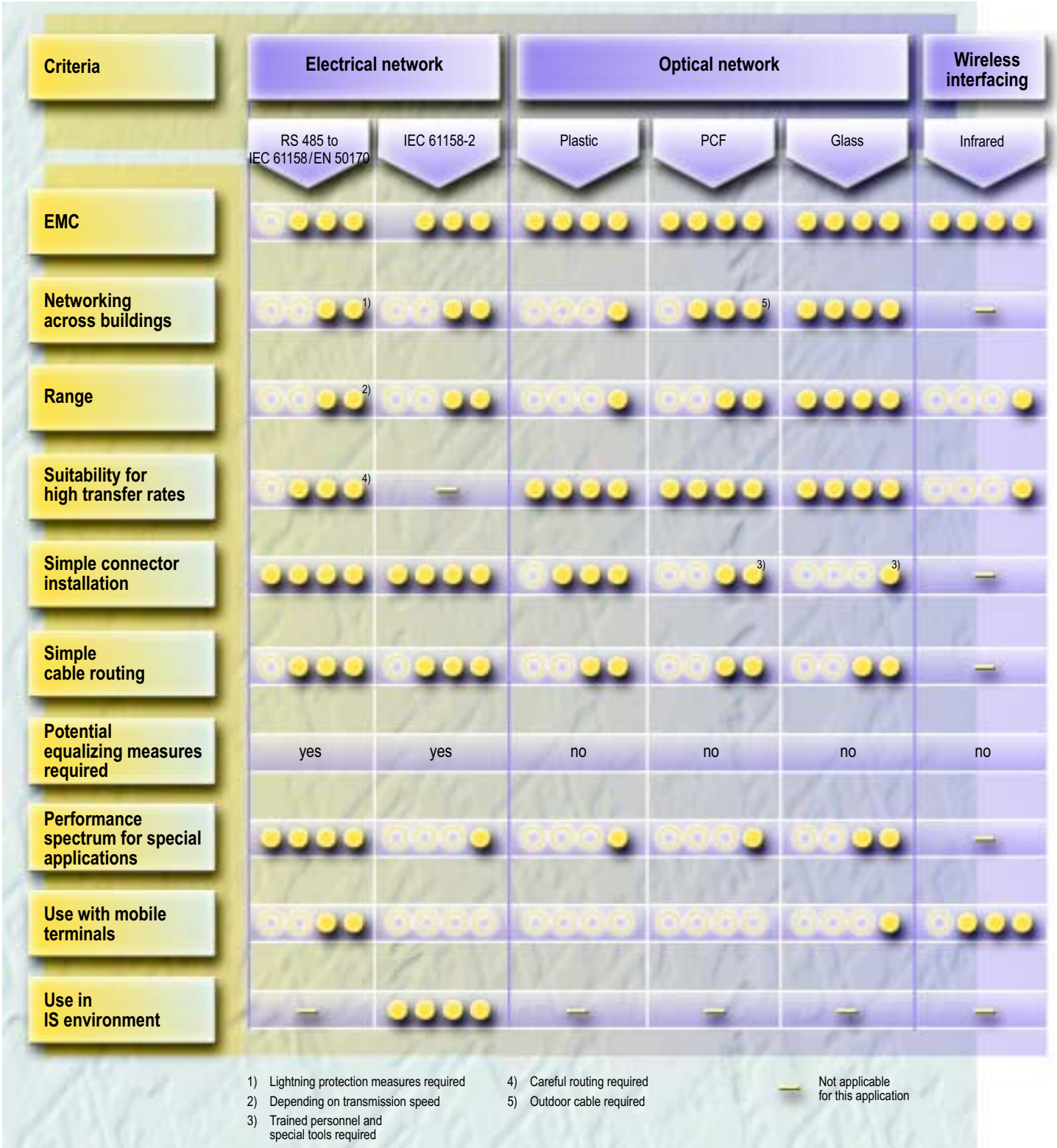

Figure 8: Selection criteria for the transmission media

PROFIBUS
FastConnect technology

PROFIBUS FastConnect® is a system for the fast and easy assembly of PROFIBUS copper cables.

The system comprises three compatible components:

- FastConnect bus cables for rapid installation
- FastConnect stripping tool
- FastConnect PROFIBUS bus connector

PROFIBUS FastConnect bus cables can also be connected to conventional bus connectors.

The FastConnect stripping technique enables fast and easy connection of PROFIBUS connectors to PROFIBUS cables.

The special structure of the FastConnect bus cables enables the use of the FastConnect stripping tool which in one step, can strip the outer casing and the woven shield with perfect precision.

The cable prepared in this way is connected in the FastConnect bus connector by means of the insulation displacement method.

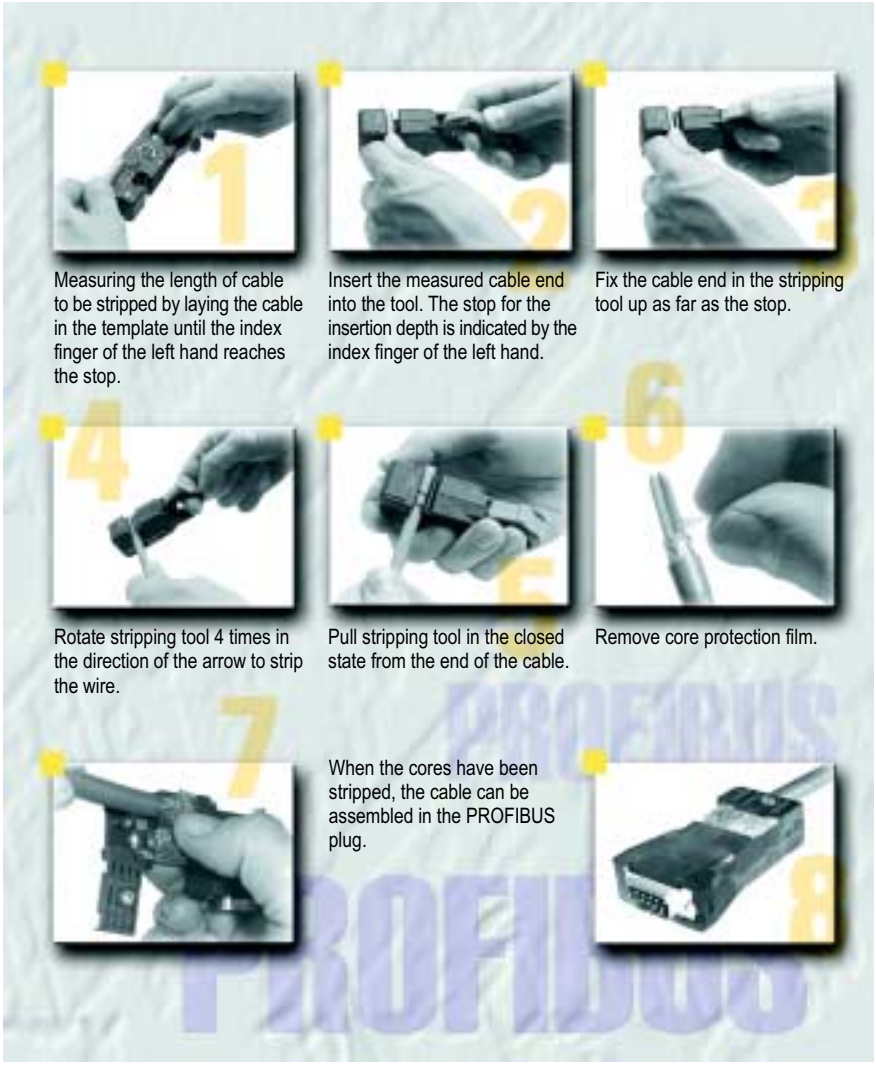
1
Measuring the length of cable to be stripped by laying the cable in the template until the index finger of the left hand reaches the stop.
2
Insert the measured cable end into the tool. The stop for the insertion depth is indicated by the index finger of the left hand.
3
Fix the cable end in the stripping tool up as far as the stop.
4
Rotate stripping tool 4 times in the direction of the arrow to strip the wire.
5
Pull stripping tool in the closed state from the end of the cable.
6
Remove core protection film.
7
When the cores have been stripped, the cable can be assembled in the PROFIBUS plug.
8

Figure 9: Fast installation with PROFIBUS FastConnect

The PROFIBUS FastConnect system has the following advantages:

- Fast and easy assembly of PROFIBUS copper cables due to the preset stripping tool (FC stripping tool)
- Shorter connection times for terminals by stripping the outer casing and the woven shield in one step
- Termination can be checked in the assembled state through the transparent cover for the insulation piercing terminals thanks to color-coding.

Different types of cable are available for the various application possibilities for configuring PROFIBUS networks.

PROFIBUS
LAN cables

The distinguishing features of PROFIBUS LAN cables are:

- Particular suitability for installation in industrial environments subject to electromagnetic interference, thanks to their double shielding
- Grounding continuity that can be implemented via the outer casing of the LAN cable and the bus terminal's ground terminals
- Easy length determination, thanks to meter markings on the cable.

Bus cables with FastConnect technology

The silicone-free FastConnect (FC) bus cables are of a radially symmetric design which allows a stripping tool to be used. In this way, bus connectors can be assembled quickly and easily.

- PROFIBUS FC Standard Cable
  Standard bus cable specially designed for fast assembly.
  Its properties are the same as those of the previous standard bus cable
- PROFIBUS FC Robust Cable
  This cable is specially designed to withstand aggressive chemicals and mechanical stress
- PROFIBUS FC Food Cable
  By using a PE casing material, this bus cable is suitable for use in the food, beverages and tobacco industry
- PROFIBUS FC Underground Cable
  This cable is specially designed for burying in the ground. It differs from the standard PROFIBUS bus cable in that it is equipped with an additional casing.
- PROFIBUS FC Trailing Cable
  Bus cable for the special application of forced movement guidance in a track chain, e.g. in continuously moving machine parts (stranded conductor).
- PROFIBUS FC Process Cable
  This bus cable is specially designed for field bus systems in accordance with IEC 61158-2, e.g. PROFIBUS-PA

Figure 10: LAN cables for PROFIBUS

Bus cables without FastConnect technology

- PROFIBUS festoon cable
  Flexible bus cable (stranded conductor) for special application in festoons.
  For round cables, the operation of a cable cart is recommended.
- PROFIBUS FRNC cable
  Two-wire shielded, flame retardant and halogen-free bus cable with copolymer outer casing FRNC (Flame Retardant Non Corrosive)
- PROFIBUS flexible cable
  Bus cable for highly flexible applications:
  Special cable (stranded conductor) for use on moving machine parts (5 million torsional movements on 1 m cable, ±180°).
- Shipboard cable
  Halogen-free, tread-resistant, flame retardant shipboard approved fiber optic cables for laying on board ships and offshore installations in enclosed areas and on open decks.

PROFIBUS
Hybrid cables

DESINA and ECOFAST

The ECOFAST and DESINA systems are an open system solution in the innovative area of distribution without a control cabinet. They set new standards for equipping machines and plants with automation, switch and drive components. The basis is fully distributed installation and direct machine assembly of the units.

All automation, drive and installation components are combined to make an integrated total solution with standardized cables and connections for data and power.

There is a user-friendly configuration tool to help design the power engineering for the plant.

In a hybrid cable, copper cables and fiber optic cables are contained in one cable. The fiber optic cables in this case are plastic FOCs.
This means that by using hybrid cables the data and the power supply can be transferred together with one cable.
The line-type power supply for the consumers uses a power bus.

Communication via standardized field buses and uniformly standardized interfaces make DESINA and ECOFAST an open, manufacturer-independent and flexible system solution.

DESINA is the brand name for **DE**centralized and **S**tandardized **IN**stall**A**tion technology for machine tools;
ECOFAST stands for **E**nergy and **CO**mmunication **F**ield Inst**A**llation sy**ST**em.

Hybrid cables mean a reduction in overall costs from planning stage to standard production by:

Figure 11: DESINA Hybrid Cable

Figure 12: ECOFAST Hybrid Cable

- Reducing configuration times, cabling expenditure, the number of versions and machine downtimes
- Shorter assembly and commissioning times
- Better plant availability thanks to shorter service times
- Less floor space required for machines and installations
- Greater flexibility
- Increased availability through diagnostics

DESINA hybrid cable

The rugged hybrid cable approved for trailing contains two plastic FO cables for data communication and four copper wires (1.5 mm^2) to supply power to DESINA nodes.

The DESINA hybrid cable is particularly suitable for connecting locally installed DESINA components.

ECOFAST hybrid cable

The rugged hybrid cable approved for trailing contains two copper wires for data communication and four copper wires (1.5 mm^2) to supply power to ECOFAST nodes.

PROFIBUS
Fiber-optic cables

The optical PROFIBUS network is configured with fiber-optic cables (FOs).

Fiber-optic cables are available in plastic, PCF or glass fiber:

Glass fiber-optic cables

Two-wire cable for optical PROFIBUS networks in indoor and outdoor installations:

- FO standard cable
  FO for indoor and outdoor installation.
- FO trailing cable
  Fiber-optic cables for special application in forced movement guidance e.g. continuously moving machine parts (track chain application) indoors and outdoors.
- FO indoor cable
  Halogen-free, tread-resistant and flame retardant fiber optic cable for use in buildings.

Plastic FO cable

Duplex or standard cables for indoor applications:

- Plastic FO, duplex core
  Flat duplex core with single PVC casing for indoor applications with low mechanical stress, such as laboratory installations or in cabinets. Cable lengths up to 50 m.
- Plastic FO, standard cable
  Rugged round cable with violet PVC outer casing and kevlar strain elements, as well as two plastic fibers with a rugged polyamide inner casing. For indoor applications with cable lengths up to 80 m.

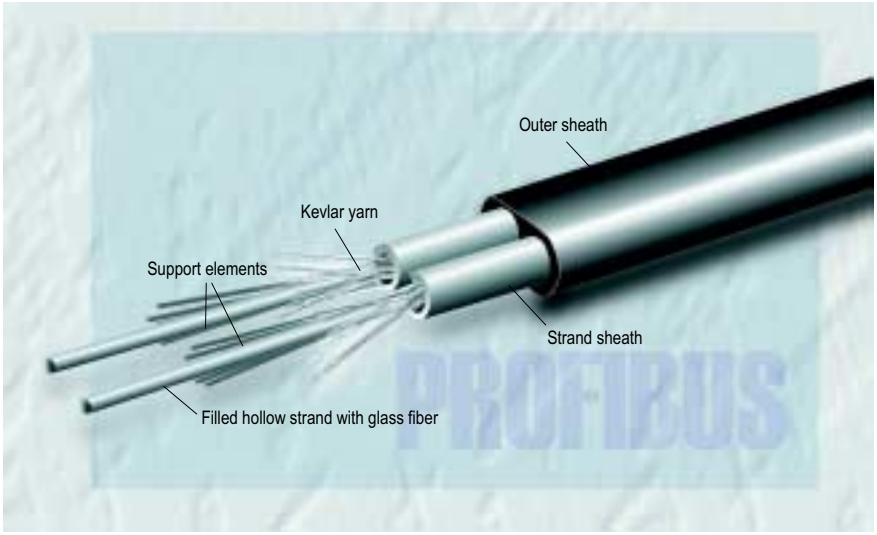

Figure 13: Fiber-optic cable configuration

PCF FO cables

Standard cable for indoor applications

- PCF FO cable,[1)]
  standard cable
  Rugged round cable with violet PVC outer casing and kevlar strain elements for indoor applications with cable lengths up to 400 m.

1) Polymer Cladded Fiber,
also known as HCS® FO cable.
HCS® is a registered trademark of Lucent Technologies

Shipboard duplex FO

Halogen-free, tread-resistant, flame retardant, shipboard approved fiber-optic cable for laying on board ships and offshore units in enclosed areas and on open decks.

Fiber-optic cables offer the following advantages:

- Rugged design for industrial indoor and outdoor applications
- Halogen-free version for use in buildings
- Trailing cable for special application in forced movement
- High immunity to interference because of insensitivity to electromagnetic fields
- Available precut/preassembled
- Protection of transmission line against electromagnetic interference
- Secure against unauthorized listening, due to lack of radiation from the cable.

PROFIBUS
Connecting cables, bus connectors

PPROFIBUS 830-1 T connecting cable

The PROFIBUS 830-1T connecting cable can be used to establish the connection between the electrical PROFIBUS interface and the PROFIBUS nodes (OLM, OBT and terminal nodes) up to 12 Mbit/s.

It is equipped at both ends with a 9-pin sub D connector.

Both ends of the cable are terminated with a resistor combination (cannot be disabled).

PROFIBUS 830-2 connecting cable

The 830-2 connecting cable is used to connect PROFIBUS nodes (e. g. HMI) to automation devices for transmission rates up to 12 Mbit/s.

It is pre-assembled with two 9-pin connectors.

One plug of the pre-assembled connecting cable is equipped with a PG interface.

Bus connectors

RS 485 bus connectors for PROFIBUS are used to connect a PROFIBUS node or a PROFIBUS network component to PROFIBUS LAN cables.

Different versions of the bus connectors are available and are optimized for the devices to be connected:

- Bus connectors with an axial cable outlet (180°)
  e.g. for PCs and SIMATIC HMI OPs, for transfer rates up to 12 Mbit/s with integrated bus terminating resistor

Figure 14: 830-1 T connecting cable

Figure 15: 830-2 connecting cable

- Bus connector with vertical cable outlet (90°)
  This cable allows a vertical cable outlet (with and without PG interface) for transfer rates up to 12 Mbit/s with integrated bus terminating resistor. At transfer rates of 3, 6 or 12 Mbit/s, the SIMATIC S5/S7 connecting cable is required for the connection between the bus connector with additional PG interface and the programming device.
- Bus connector with 30° cable outlet
  (low-cost version)
  without a PG interface for transfer rates up to 1.5 Mbit/s and without an integrated bus terminating resistor.
- PROFIBUS FastConnect RS 485 bus connector
  (90° or 180° cable outlet)
  with transfer rates up to 12 Mbit/s for fast, easy mounting with the insulation displacement method
  (for rigid and flexible wires)

Figure 16: PROFIBUS FC RS 485 bus connector plug 180

Figure 17: Bus connector with 90° cable outlet

PROFIBUS SpliTConnect for fieldbus systems to IEC 61158-2

SpliTConnect® for fieldbus systems is used for configuring field bus segments according to IEC 61158-2 (e.g. PROFIBUS-PA) with field device connecting points.

Thanks to the FastConnect connection system (FastConnect stripping tool, FC process cable according to IEC 61158-2) the LAN cable is easy to assemble.

The FC process cable is stripped in the same way as for FastConnect (see page 7).

The SpliTConnect tap enables the configuration of fieldbus segments according to IEC 61158-2 (e.g. PROFIBUS-PA) with terminal connecting points.

Additional grounding of the SpliTConnect tap can be implemented by a contacting screw.

The terminals can be connected via the FC process cable according to IEC 61158-2 or the SpliTConnect M12 outlet or M12 jack.

The SpliTConnect coupler can be used to construct a PROFIBUS-PA hub by cascading SpliTConnect taps.

By replacing the contacting screw with the SpliTConnect terminator, the SpliT-Connect tap can be used as a bus terminating element.

Figure 18: SpliTConnect tap and terminator

Figure 19: SpliTConnect coupler

Figure 20: SpliTConnect M12 outlet

Figure 21: SpliTConnect M12 jack

PROFIBUS
Connection examples

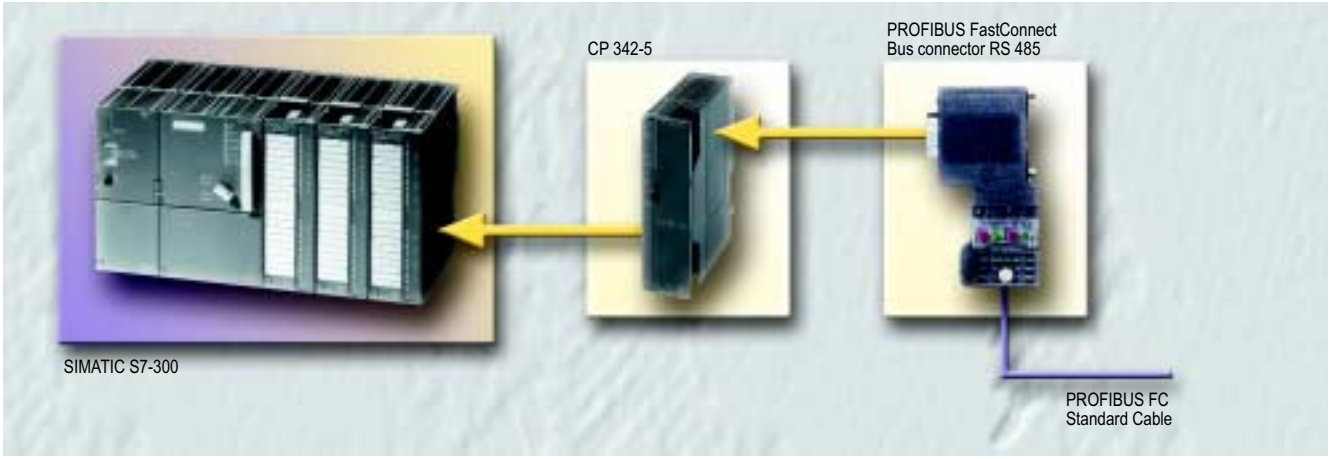

Figure 22: Typical connection for electrical networking with PROFIBUS FastConnect RS 485 bus connector

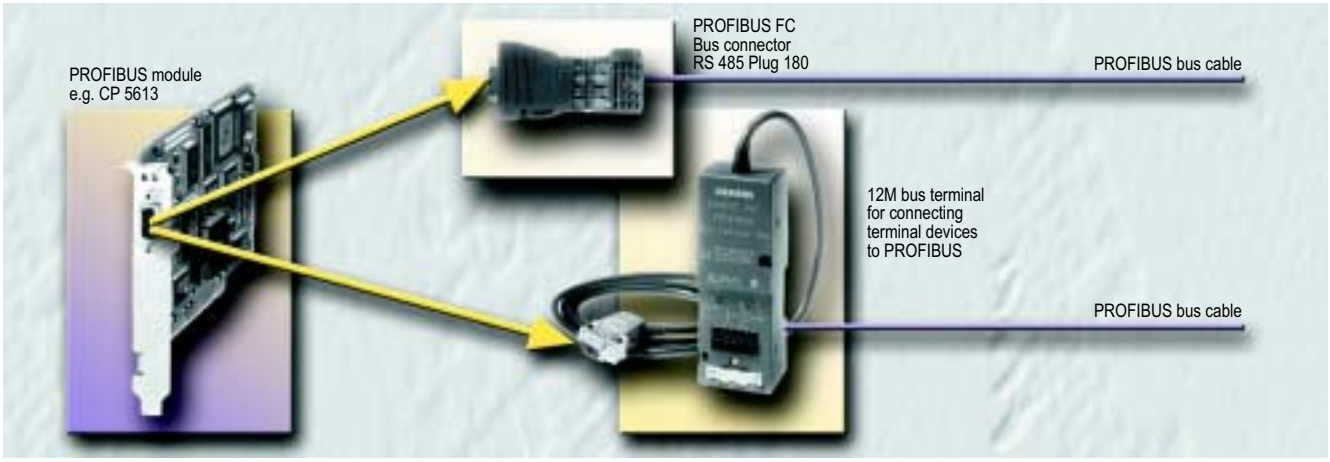

Figure 23: Typical connection for electrical networking

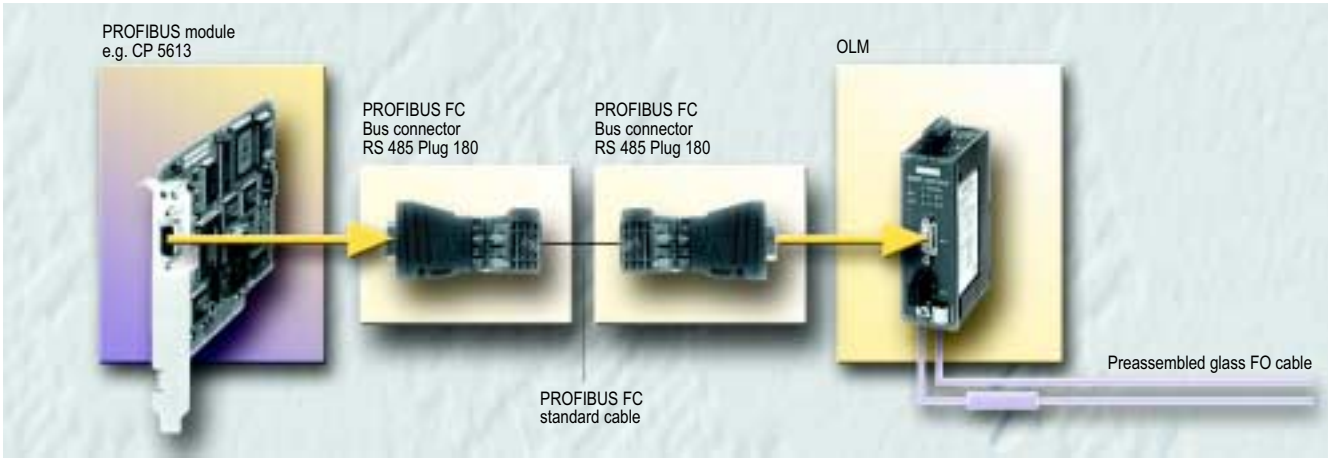

Figure 24: Typical connection for optical networking

PROFIBUS
Connection examples

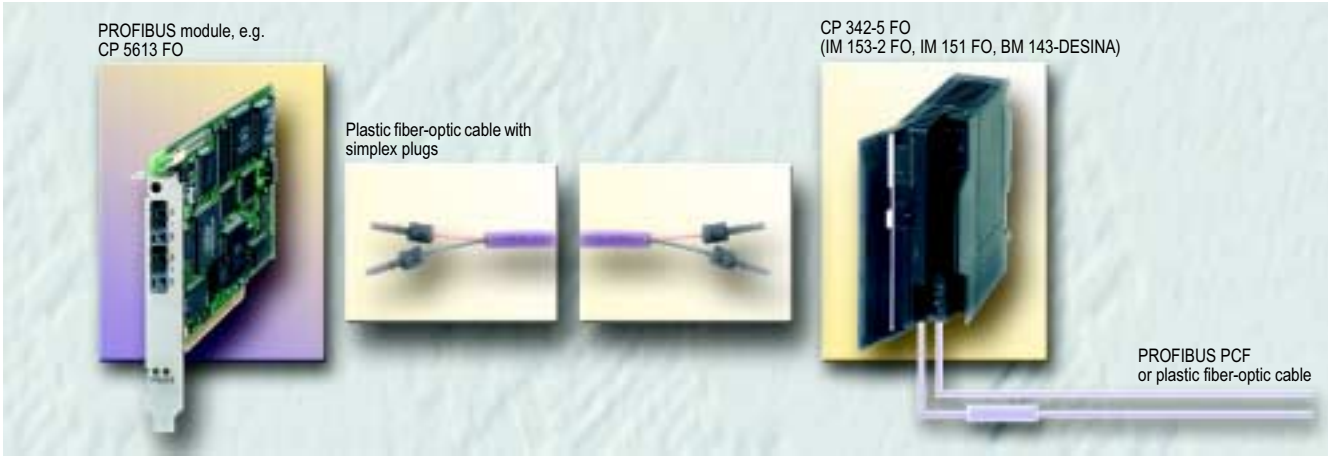

Figure 25: Typical connection for optical networking with plastic FO cables

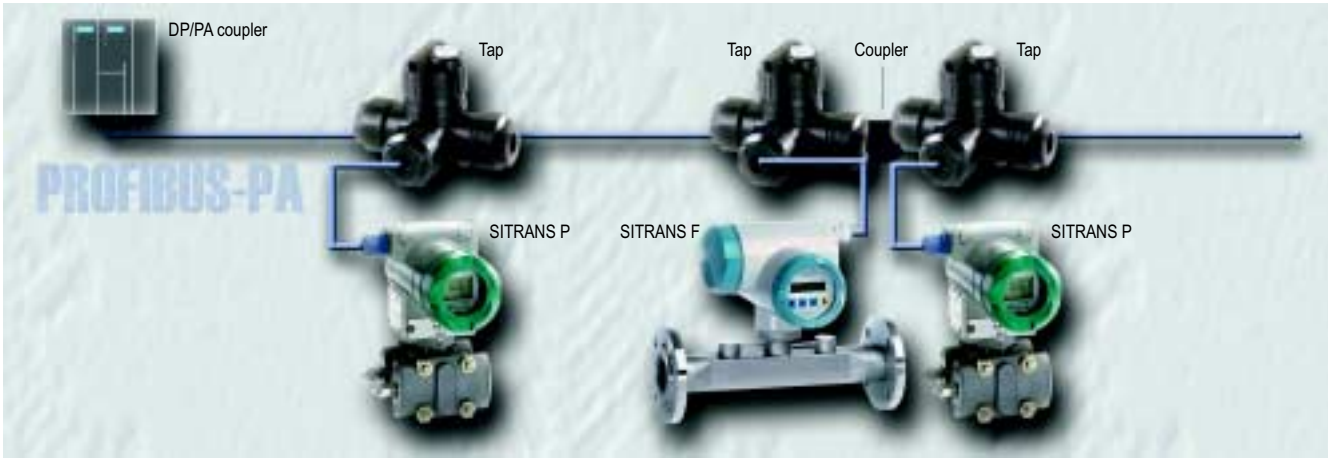

Figure 26: Typical connection for an intrinsically safe network

PROFIBUS
Network components

Optical Link Modules (OLM)

With PROFIBUS OLM (Optical Link Modules) Version 3, optical PROFIBUS networks can be configured in a bus, star or hot standby ring topology.

The transfer rate of an FOC line is not dependent on distance and can be as much as 12 Mbit/s.

Typical OLM applications include:

- PROFIBUS-based system buses
- Inter-building networking with glass FO cables
- Mixed networks with electrical and optical segments
- Large expansion networks (road tunnels, traffic control systems)
- Networks with high availability requirements (hot standby ring networks)
- OLM/G12-EEC for use at temperatures up to –20 °C

The functions of optical link modules include:

- Automatic recognition of all PROFIBUS data transfer rates: 9.6 kbit/s to 12 Mbit/s including 45.45 kbit/s (PROFIBUS-PA)
- High availability by media redundancy. The distance between two OLMs in the redundant ring is limited only by the optical sensing range of the modules.
- Segmentable RS 485 interface (sub D female connector)
- Unlimited multimaster mode: Extended segmenting function for error localization on fiber-optic cable and RS 485 segments
- Fast localization of faults:
  - Indication of module status via floating signaling contact
  - Inspection of the fiber-optic cable quality: Measuring output for optical receivers for logging and validity check of FO cable line attenuation with a voltmeter
  - Indication of fault at the point of origin, no indication of secondary faults
- High cascading depth: Line and hot standby ring up to 124 OLMs (only limited by monitoring times)
- Wide range by use of glass fiber-optic cables up to a length of 15 km

PROFIBUS bus terminals

PROFIBUS bus terminals enable a bus node to be connected to a PROFIBUS network.

Various versions are available:

- Up to 1.5 Mbit/s RS 485 bus terminal
- Up to 12 Mbit/s 12M bus terminal.

Bus terminals are used:

- As a prepared unit connector for PROFIBUS nodes
- As a simple connector of nodes to PROFIBUS networks by clipping on the spur line with sub D connectors
- To implement multi-point connections by directly butt-mounting a number of bus terminals (up to 32 nodes per segment) in the case of the 12M bus terminal.

RS 485 repeater

The RS 485 IP 20 repeater connects two PROFIBUS or MPI bus segments in the RS 485 standard with max. 32 nodes, including a repeater.

It enables transfer rates from 9.6 kbit/s to 12 Mbit/s (including 45.45 kbit/s for PROFIBUS-PA).

The repeater is used:

- To increase the number of nodes (max. 127 nodes) and the expansion
- To galvanically isolate segments
- To regenerate signals in amplitude and time

Figure 27: PROFIBUS Optical Link Module (OLM)

Figure 28: PROFIBUS bus terminals

Figure 29: RS 485 repeater

PROFIBUS
Network components

Diagnostic repeater

The diagnostic repeater determines, initiated by STEP 7 or COM PROFIBUS, the topology of the bus system and stores it in the internal diagnostics memory.

If there is a fault, the repeater automatically transfers a standard diagnostic message to the bus master, containing details of:

- The affected segment
- The fault location (e.g. between nodes X and Y)
- The distance of the fault location in meters from nodes X and Y as well as from the repeater
- The type of fault

The following faults are diagnosed:

- Break in data cables A, B
- Short circuit data cable to shield
- Missing bus terminating resistor

Intermittent faults are also detected.

The diagnostic messages are displayed graphically in STEP 7 and COM PROFIBUS. They are fully integrated into SIMATIC® system diagnostics (e.g. overview diagnostics, "Report system fault" function).

Power rail booster

The power rail booster enables a PROFIBUS-DP connection via contact conductors, such as those used for monorail conveyors or storage and retrieval systems for high-bay warehouses, for example. The diverse PROFIBUS-DP system capabilities, such as diagnostics and PROFIsafe safety technology via bus, can continue to be used here.

Monorail conveyors

Vehicle control systems for monorail conveyors can be implemented economically on the basis of SIMATIC standard components.
High availability, short reaction times and easy upgradeability are achieved by using distributed control, e.g. SIMATIC ET 200S® with IM151/CPU. With SIMATIC STEP 7, the user can also program them over a contact conductor.

Storage and retrieval systems for high-bay warehouses

With storage and retrieval systems for high-bay warehouses, maintenance-intensive data photo-electric barriers can be replaced, thus increasing plant availability.

Applications with slip rings

The power rail booster enables PROFIBUS-DP routing via rotating axes even with large diameters.

Figure 30: Diagnostics repeater

Figure 31: Graphic representation of the fault location in STEP 7

Figure 32: Power rail booster

PROFIBUS
Network components

Optical Bus Terminal (OBT)

With the OBT (Optical Bus Terminal), a PROFIBUS-DP station without an integrated optical interface or an existing RS 485 bus segment is connected to an optical line. In this way, it opens up to existing DP units or network segments the advantages of optical data transmission in combination with units that have an integrated optical interface (e.g. ET 200S FO).

The OBT also serves as an "outlet" for the connection of mobile units (e.g. PG) without bus interruption.

The PROFIBUS-DP station is connected at an RS 485 interface by a connecting cable terminated at both ends, e.g. 830-1T connecting cable, to the RS 485 interface of the OBT. The OBT is integrated into the optical line by two optical interfaces.

The following optical transmission media can be connected to the OBT:

- Plastic FO cables preassembled with 2 × 2 simplex connectors, max. 50 m
- PCF FO cables preassembled with 2 × 2 simplex connectors, max. 300 m.

The OBT offers the following advantages:

- Existing units with electrical interfaces and existing bus segments can be linked to the new optical network
- An economical solution for simple optical networking
- Save time with simple and fast assembly of the fiber-optic cable connector right on site.

Figure 33: OBT for PROFIBUS-DP

Figure 34: ILM

PROFIBUS Infrared Link Module (ILM)

With the Infrared Link Module (ILM), a wireless PROFIBUS link suitable for all protocols with a range of up to 15 m is possible. At a transmission rate of up to 1.5 Mbit/s, individual stations can be linked every two segments.

The ILM is used for

- Communication with mobile stations, e.g. driverless transport systems (DTS)
- Communication with changing stations, e.g. stations along conveyor lines
- Fast system assembly and temporary configurations, e.g. test setups
- Replacing worn systems, e.g. slip rings, conductors

An ILM illuminates a circle 4 m in diameter from a distance of 11 m.

In this way, the ILM makes it possible to

- Install without an adjustment aid thanks to the wide transmission angle
- Replace worn systems (slip ring, conductors) and
- When there is a fault change the electronics quickly and easily thanks to the permanent wiring.

PROFIBUS
Network components

Active RS 485 terminating element

The active RS 485 terminating element terminates PROFIBUS, thus ensuring a defined RS 485 signal level and suppressing reflections on the line.

As operation is not dependent on field devices, they can be decoupled from the bus without feedback.

The power supply is not dependent on the bus nodes.

Voltage is supplied to the terminating resistor separately to the other I/O components, either permanently or by voltage connected before the I/O devices.

Bus system termination enables the stations (e. g. ET 200L/S) to be coupled and decoupled at random, without causing a malfunction.

Figure 35: Active RS 485 terminating element

Figure 36: BT200 hardware test device

Hardware Test Devices BT200

During the installation phase, the BT 200 test unit can be used to check the PROFIBUS cable. Installation errors can be detected quickly and without any effort, no special knowledge of PROFIBUS is required.

Even before the plant is commissioned, it is possible to test the RS 485 interface of the PROFIBUS-DP slaves with the BT 200. It is also possible to list the accessible slaves on the wired-up bus and this without a master on the PROFIBUS-DP.

Individual bus segments can be function-tested in advance like this, which reduces commissioning times. In cases of faults, the latter two test functions are useful for localizing the fault and thus minimizing plant downtimes.

In future, the option will be available to use a logger kit to save the test results and print them out via a PC in the form of a report.

In addition to German and English, the BT 200 will also have available French, Spanish, Italian and Portuguese.

PROFIBUS
Transitions

DP/PA link and DP/PA coupler

The DP/PA link and DP/PA coupler implement the transition between PROFIBUS-DP and PROFIBUS-PA.

DP/PA link

The DP/PA link is used for large volumes of project data and high time requirements.
The DP/PA link is a slave on PROFIBUS-DP and a master on PROFIBUS-PA.
The programmable controller/automation system addresses the field devices via the DP/PA link as a modular slave, whose submodule are the PA units.

DP/PA coupler

The DP/PA coupler is used for small volumes of project data and low time requirements.
When the DP/PA coupler is used, the data transfer rate on PROFIBUS-DP is limited to 45.45 kbit/s. The volume of project data is defined either by the maximum number of addressable slaves (field device) or by the maximum cycle time.

IE/PB link

The IE/PB link, as a self-contained component, creates a seamless transition between Industrial Ethernet and PROFIBUS. Thus, for example, control and monitoring systems can simply access field devices on PROFIBUS from Industrial Ethernet.
This makes it possible to implement vertical integration from command level to field level.
The IE/PB link supports PROFInet functionality.

DP/AS interface link

The DP/AS interface link allows network transition between PROFIBUS-DP and the AS interface.
It is the PROFIBUS-DP slave (according to EN 50170) and the AS interface master (according to EN 50 295) and enables the AS-Interface to operate on PROFIBUS-DP.

The DP/AS interface is available in two versions:

Figure 37: DP/PA link

Figure 38: IE/PB link

Figure 39: DP/AS interface link

Figure 40: DP/EIB link

The DP/AS 20E interface link degree of protection IP 20

Can link up to 62 AS interface slaves and implement integrated analog value transmission (according to the extended AS interface specification V2.1).

The DP/AS interface link degree of protection IP 65

Up to 31 AS interface slaves can be connected to the DP/AS interface link.

DP/EIB link

The DP/EIB link enables connection of the two open standard communication systems for production and process automation PROFIBUS-DP and for building automation EIB.
In this way, EIB for building automation is integrated into PROFIBUS-DP.

Ordering data

Designation	Order no.
PROFIBUS FC standard cable, cut-to-length	6XV1 830-0EH10
PROFIBUS FC robust cable, cut-to-length	6XV1 830-0JH10
PROFIBUS FC food cable, cut-to-length	6XV1 830-0GH10
PROFIBUS FC ground cable, cut-to-length	6XV1 830-3FH10
PROFIBUS FC trailing cable, cut-to-length	6XV1 830-3EH10
PROFIBUS FC process cable, cut-to-length ▪ for EX applications ▪ for non-EX applications	 6XV1 830-5EH10 6XV1 830-5FH10
SIENOPYR PROFIBUS shipboard cable, cut-to-length	6XV1 830-0MH10
PROFIBUS festoon cable, cut-to-length	6XV1 830-3GH10
PROFIBUS FRNC cable, cut-to-length	6XV1 830-0LH10
PROFIBUS flexible cable, cut-to-length	6XV1 830-0PH10
ECOFAST hybrid cable, cut-to-length	6XV1 830-7AH10
DESINA hybrid cable, cut-to-length	6XV1 830-6CH10
FO standard cable, 1 m	6XV1 820-5BH10
FO trailing cable, 1 m	6XV1 820-6BH10
FO indoor cable, 1 m	6XV1 820-7BH05
Shipboard duplex FO	6XV1 830-0NH10
Plastic FO standard cable, cut-to-length	6XV1 821-0AH10
Plastic FO duplex core, 50 m	6XV1 821-2AN50
PCF fiber optic cable, 75 m	6XV1 821-1BN75
PROFIBUS 830-1 connecting cable, 1.5 m	6XV1 830-1CH15
PROFIBUS 830-2 connecting cable, 3 m	6XV1 830-2AH30
Bus connector with axial cable outlet	6GK1 500-0EA02
Bus connector with vertical cable outlet, with PG interface	6ES7 972-0BB11-0XA0
Bus connector with 30° cable outlet	6ES7 972-0BA30-0XA0
PROFIBUS FastConnect bus connector ▪ with 90° cable outlet, with PG interface ▪ with 180° cable outlet	 6ES7 972-0BB50-0XA0 6GK1 500-0FC00

Ordering data (continued)

Designation	Order no.
SpliTConnect coupler	6GK1 905-0AC00
SpliTConnect terminator ▪ for EX applications ▪ for non-EX applications	 6GK1 905-0AD00 6GK1 905-0AE00
SpliTConnect tap	6GK1 905-0AA00
SpliTConnect M12 outlet	6GK1 905-0AB00
SpliTConnect M12 jack	6GK1 905-0AF00
PROFIBUS OLM/P11	6GK1 502-2CA10
PROFIBUS bus terminals ▪ with 3 m cable ▪ with 1.5 m cable	 6GK1 500-0AB00 6GK1 500-0DA00
PROFIBUS 12M bus terminal	6GK1 500-0AA10
PROFIBUS repeater	6ES7 972-0AA01-0XA0
PROFIBUS OBT	6GK1 500-3AA00
PROFIBUS ILM	6GK1 503-0AA00
Active RS 485 terminating element	6ES7 972-0DA00-0AA0
Hardware BT200 test devices	6ES7 181-0AA01-0AA0
Diagnostics repeater	6ES7 972-0AB00-0XA0
Power rail booster	6ES7 972-4AA00-0XA0
DP/PA coupler ▪ intrinsically safe version ▪ non-intrinsically safe version	 6ES7 157-0AD00-0XA0 6ES7 157-0AC80-0XA0
Interface module IM 157 for DP/PA link	6ES7 157-0AA81-0XA0
IE/PB link	6GK1 411-5AA00
DP/AS interface link 20E	6GK1 415-2AA01
DP/AS interface link 65	6ES7 156-0AA01-0XA0
DP/EIB link	6GK1 415-0AA01

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Abbreviations, explanations

Term	Meaning	Explanation
BFOC	Bayonet fiber optic connector	Fiber-optic connector, ST-compatible
BT200	200 bus tester	Hardware test device for PROFIBUS
CP	Communication processor	Interface module for communication tasks
CPU	Central processing unit	Central controller module, e.g. for SIMATIC S5/S7
DP	Distributed I/O devices	Input or output modules decentralized from the CPU (central processing unit of the PLC). The link between the programmable controller and the distributed I/O devices is made via the PROFIBUS-DP bus system.
EEC	Extended environmental conditions	Extended environmental conditions
Intrinsically safe	—	Ex safety measure according to DIN
EMC	Electromagnetic compatibility	—
Ex	Intrinsically safe protective measure according to DIN EN 50 020	Relevant to designated modules, may also be used in areas where there is a risk of explosion. (Follow specifications!)
FC	FastConnect	Fast assembly system
FMS	Fieldbus message specification	Top partial layer of layer 7 for PROFIBUS; it covers the functions protocol machine, PDU compilation and coding/decoding and interpretation of the protocol data element.
DTS	Driverless transport system	Moving, driverless machine parts
HCS	Hard cladded silica	Trademark of Spectran Specialty Optics
HMI	Human-machine interface	Operator control and visualization products/systems at Siemens
IEC	International Electrotechnical Commission	—
ILM	Infrared link module	Infrared network component
LAN	Local area network	—
FOC	Fiber-optic cable	—
OBT	Optical bus terminal	Network component for PROFIBUS
OLM	Optical link module	Network component for PROFIBUS
PA	Process automation	Protocol profile based on PROFIBUS-DP with intrinsically safe transmission techniques in accordance with IEC 61158-2
PCF	Polymer cladded fiber	Application for plastic fiber optic cables for large distances
PNO	PROFIBUS Nutzerorganisation e.V.	Organization for PROFIBUS users and suppliers
PROFIBUS	Process fieldbus	European fieldbus standard according to EN 50 170

Abbreviations (continued)

Term	Meaning	Explanation
Protocol	—	Transfer specification for data communication. This specification determines both the formats of the messages and the data flow during data transmission
ST connector	Straight tip connector	Connector for fiber-optic cables with bayonet interlock (ST = registered trademark of AT&T)
Topology	Type of wiring arrangement between nodes	The most important basic forms are: ▪ bus ▪ tree ▪ line ▪ star ▪ redundant ring Combinations of all the basic forms are possible.

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